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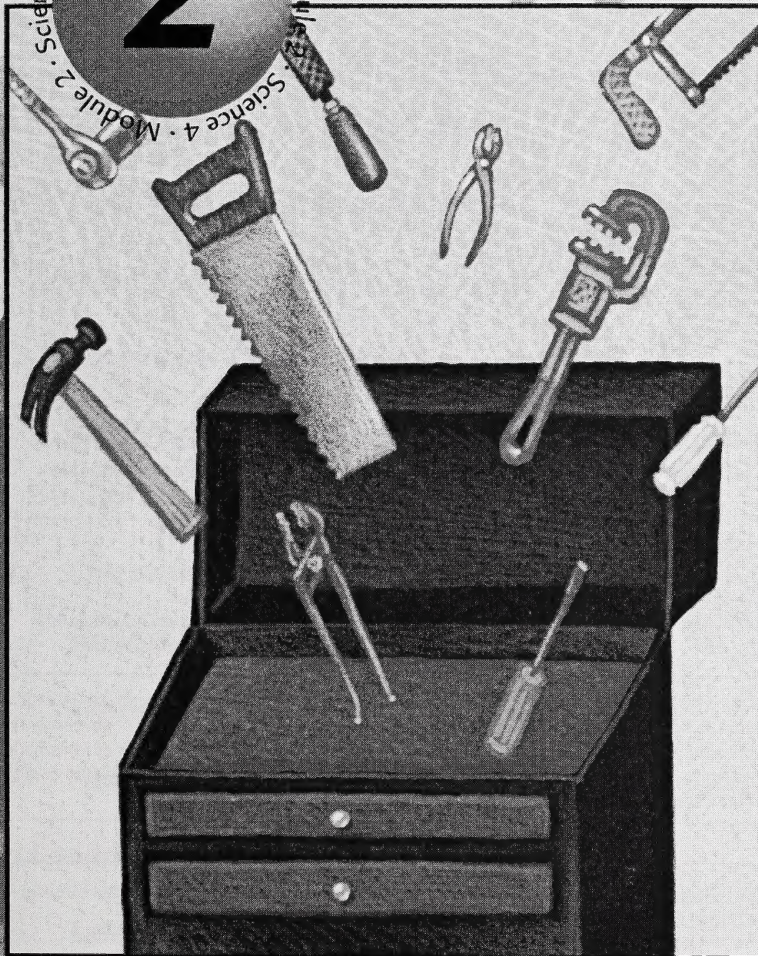


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Science 4

Building Devices and Vehicles That Move
Home Instructor's Guide and
Assignment Booklet 2B

2



Alberta
EDUCATION



Learning
Technologies
Branch

Science 4
Module 2: Building Devices and Vehicles That Move
Home Instructor's Guide and Assignment Booklet 2B
Learning Technologies Branch
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The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Home Instructor's Guide and Assignment Booklet.

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	



You may find the following Internet sites useful:

- Alberta Education, <http://www.education.gov.ab.ca>
- Learning Technologies Branch, <http://www.education.gov.ab.ca/lrb>
- Learning Resources Centre, <http://www.lrc.education.gov.ab.ca>

Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

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Table of Contents

Module 2: Building Devices and Vehicles That Move

Notes to the Home Instructor	4
Section 2: A Designer at Work	5
Overview	5
Assessment and Feedback	5
Websites Mentioned in Module 2: Section 2	5
Additional Required Materials	5

Lesson Summaries

Lesson 4: Design Work	5
Lesson 5: Designing a Machine	6

Section 3: Building and Refining a Design	6
Overview	6
Assessment and Feedback	6
Websites Mentioned in Module 2: Section 3	7
Additional Required Materials	7

Lesson Summaries

Lesson 6: Testing, Testing	8
Lesson 7: Improving Your Machine	9
Lesson 8: Final Testing	9

Module 2: Building Devices and Vehicles That Move

Notes to the Home Instructor

This booklet contains the following components for you and your student:

1. Home Instructor's Guide

These are notes for you. First, there is an overview, a listing of suggested websites, and a listing of additional required materials needed for the section. Then, there is an overview of the content, activities, learning outcomes, and special requirements of each lesson in the section.

Note: To ensure that you have all of the materials on hand for your student to complete the activities for each module, read through the list of materials required for the lessons. They are boxed for easy reference, as shown in the following example.

Activity 1: Cleaning by Force

- about 30 mL ketchup
- 2 white or light-coloured plates
- a watch or clock that measures seconds
- access to a sink with cold running water

2. Assignment Record Form

This is a form to send in with the assignments. Remember to paste the address label provided by your school on it. The teacher will keep track of your student's assignments, record your student's grades, and include his or her comments using this form.

3. Assignment

Your student should answer all questions in complete sentences where possible. Questions set up as lists, tables, charts, or graphs do not need sentence answers. Send the assignment to the teacher as soon as the booklet has been completed.

4. Home Instructor Feedback Form and Student Feedback Form

You and your student should complete these forms. Send them in at the same time as the assignment. They provide us with helpful information about what we are doing right and what needs to be changed.

5. Checklist

The checklist helps you confirm that all of the required components have been collected prior to submitting the completed work to the teacher. For students completing this module electronically, this checklist also includes spaces to indicate the method of submitting graphs, drawings, or photos of assignment work where required.

Section 2: A Designer at Work

Overview

This section introduces your student to the steps that lead up to the construction of a machine. The student finds out about designing a machine. In this section, a burglar alarm will be designed using several simple machines.

Assessment and Feedback

The feedback you and your student provide in the feedback forms will assist the teacher in assessing your student's progress.

The Section 2 Assignment is worth 39 marks out of a total 84 marks for this module.

Websites Mentioned in Module 2: Section 2

It is recommended that you check these websites prior to your student beginning work on this section.

Lesson 4

- Jacques Cousteau
<http://www.cousteausociety.org>

Optional Follow-up Activities

Activity 1: Invention Drawing

- Rube Goldberg
<http://www.rubegoldberg.com>

Additional Required Materials

There are no additional required materials for Lesson 4, Lesson 5, and the Optional Follow-up Activities.

Lesson Summaries

Lesson 4: Design Work

Summary

In this lesson, your student conducts the initial steps in designing a machine. He or she will first define (describe) the problem to solve or the task to perform. Then, the student will list what he or she already knows about that situation. If necessary, discuss with your student other types of practical problems that can be solved with machines. For example, "I need something to help me wake up in the morning" or, "I need something to help me open this tin can."

In Activity 4: Problem Solver, your student brainstorms ways to solve a problem. Discourage him or her from editing his or her ideas too much. The idea of brainstorming and mind mapping is to get as many ideas as possible down on the page, even if the ideas seem far-fetched or impractical.

Your student will find out about a scientific drawing in the feature A Closer Look. He or she has the opportunity to practise doing a scientific drawing in the assignment for this lesson.

While this lesson may appear long, it simply takes the student through the initial stages of the design process.

Learning Outcomes

It is expected that your student will be able to

- define or describe questions to investigate and practical problems to solve
- follow a set of steps to solve a practical problem and to carry out a test of his or her ideas

Lesson 5: Designing a Machine

Summary

In this lesson, your student will consider the construction of the burglar alarm. He or she closely investigates the different simple machines that make up the burglar alarm and begins to plan how the parts of the machine will look and what they will be made of.

In Activity 5: Designing with Pulleys, for example, the student thinks of a variety of designs for a pulley and chooses the best one to use in the burglar alarm. Your student describes his or her ideas in the assignment question for this lesson. Upon completion of the assignment question, he or she will have developed the materials list to construct the burglar alarm. Your student will assemble the machine in the next section.

You should check carefully that the plans will not lead to a dangerous situation for others. (Bouncing marbles may get underfoot; falling objects may break or shatter; insecure mountings may cause falling parts.)

Learning Outcomes

It is expected that your student will be able to

- select appropriate materials to build a machine

Section 3: Building and Refining the Design

Overview

This section introduces your student to the steps that lead up to the construction of a machine. The student finds out about construction, testing, refining, and retesting as he or she constructs a machine. In this section, a burglar alarm will be built using several simple machines.

Assessment and Feedback

The feedback you and your student provide in the feedback forms will assist the teacher in assessing your student's progress.

The Section 3 Assignment is worth 23 marks out of a total 84 marks for this module.

Websites Mentioned in Module 2: Section 3

It is recommended that you check these websites prior to your student beginning work on this section.

Lesson 6

- car crash testing
<http://auto.howstuffworks.com/crash-test.htm>

Lesson 7

- Cousteau Society
<http://www.cousteausociety.org>

Optional Follow-up Activities

Activity 2: Getting Answers

- KNOW: The Science Magazine for Curious Kids
<http://www.knowmag.ca/>
- YES Mag: The Science Magazine for Adventurous Minds
<http://www.yesmag.bc.ca/>

Additional Required Materials

Activity 6: Building and Testing

Items will vary. The list depends on the items the student chose in Lesson 5 as the best ones to build his or her burglar alarm. Items such as the following may be included:

- metal coat hangers
- empty spools from thread
- butcher string
- duct tape or masking tape
- tacks
- marbles or ball bearings
- metal pots, pans, or baking trays
- corrugated cardboard
- hole punch

Activity 7: Making a Better Burglar Alarm

- the student's assembled burglar alarm
- extra materials as required (tape, tacks, modelling clay, cardboard, etc.)

Activity 8: Are We Done Yet?

- the student's revised burglar alarm

Optional Follow-up Activities

Activity 1: Come Back to Me!

- an empty coffee tin with a plastic lid
- a drill with a 5-mm bit
- a length of narrow (about 5 mm wide) elastic
- kitchen string or cord
- a small weight that can be tied securely to a string

Lesson Summaries

Lesson 6: Testing, Testing

Summary

In this lesson, your student will consider the construction of the burglar alarm. He or she closely investigates the different simple machines that make up the burglar alarm and begins to plan how the parts of the machine will look and what they will be made of.

Learning Outcomes

It is expected that your student will be able to

- select appropriate materials to build a machine

Additional Required Materials

Activity 6: Building and Testing

Items will vary. The list depends on the items the student chose in Lesson 5 as the best ones to build his or her burglar alarm. Items such as the following may be included:

- metal coat hangers
- empty spools from thread
- butcher string
- duct tape or masking tape
- tacks
- marbles or ball bearings
- metal pots, pans, or baking trays
- corrugated cardboard
- hole punch

Lesson 7: Improving Your Machine

Summary

In this lesson, your student will construct and test the machine discussed in Lesson 6. He or she is introduced to actual ways that machines are tested. In the activity, your student constructs and tests the burglar alarm. The assignment asks questions that help the student evaluate his or her design.

Ensure that your student understands that it is often the materials that need to be refined, rather than the design.

Learning Outcomes

It is expected that your student will be able to

- select and use appropriate supplies to build a machine
- make observations and collect information to improve the design of a machine

Additional Required Materials

Activity 7: Making a Better Burglar Alarm

- assembled burglar alarm (from Activity 6)
- extra materials as required (tape, tacks, modelling clay, cardboard, etc.)

Lesson 8: Final Testing

Summary

In this lesson, your student will perform the final tests on his or her machine. In the activity for this lesson, your student will review the initial design from Lessons 6 and 7 and reflect on how the design and materials of his or her machine have changed.

If you have more than one student, this would be a good time to have them display their machines and discuss the different designs and materials used.

For the assignment, your student is asked to look at the illustration of an imaginary invention and identify the various simple machines that comprise it.

Learning Outcomes

It is expected that your student will be able to

- make observations and collect information to improve the design of a machine
- identify the simple machines within the design of an invention

Additional Required Materials

Activity 8: Are We Done Yet?

- the student's revised burglar alarm (from Activity 7)

ASSIGNMENT BOOKLET 2B

Science 4

Module 2: Section 2 Assignment and Section 3 Assignment

Home Instructor's Comments and Questions

Home Instructor's Signature

FOR HOME INSTRUCTOR USE (if label is missing or incorrect)

Student File Number:

Date Submitted:

Apply Module Label Here

Name

Address

Postal Code

*Please verify that preprinted label is for
correct course and module.*

FOR SCHOOL USE ONLY

Assigned Teacher:

Date Assignment Received:

Grading:

Additional Information:

Teacher's Comments

Teacher's Signature

Home Instructor: Keep this sheet when it is returned to you as a record of the student's progress.

INSTRUCTIONS FOR SUBMITTING THIS DISTANCE LEARNING ASSIGNMENT BOOKLET

When you are registered for distance learning courses, you are expected to regularly submit completed assignments for correction. Try to submit each Assignment Booklet as soon as you complete it. Do not submit more than one Assignment Booklet in one subject at the same time. Before submitting your Assignment Booklet, please check the following:

- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

MAILING

1. Do **not** enclose letters with your Assignment Booklets. **Send all letters in a separate envelope.**
2. Put your Assignment Booklet in an envelope and take it to the post office and have it weighed. Attach **sufficient postage** and seal the envelope.

FAXING

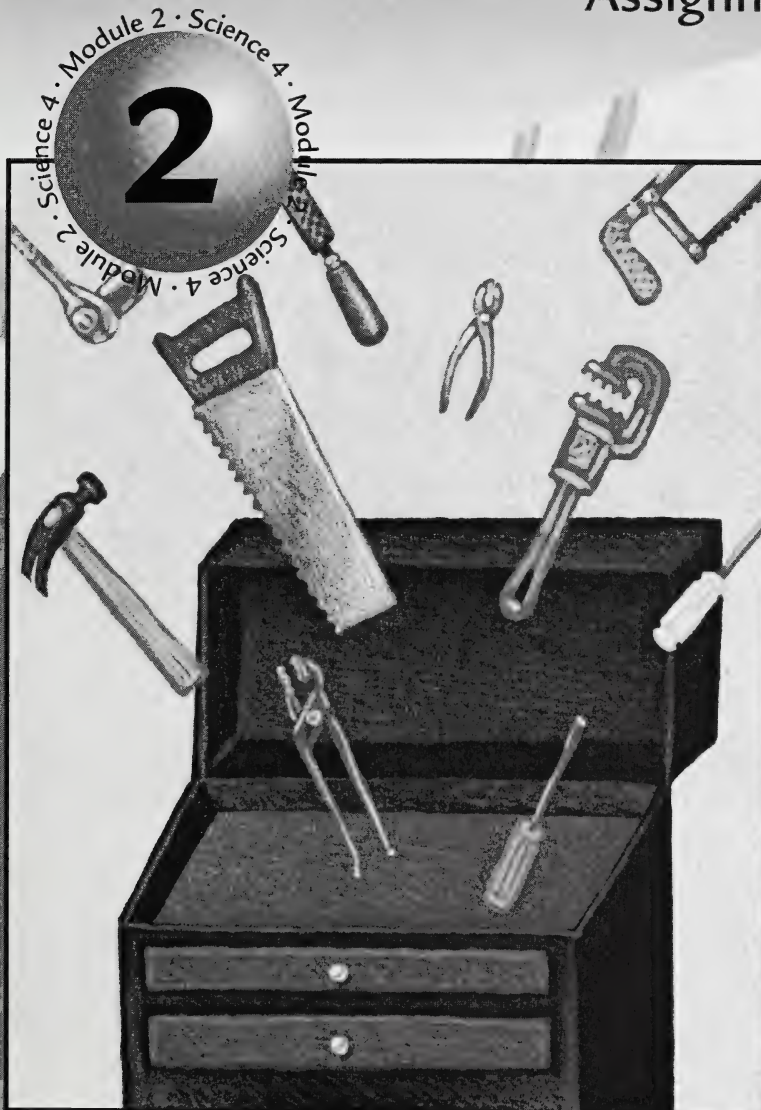
1. Assignment Booklets may be faxed to the school with which you are registered. Contact your teacher for the appropriate fax number.
2. All faxing costs are the responsibility of the sender.

E-MAILING

It may be possible to e-mail your completed Assignment Booklet to the school with which you are registered. You also may be **required** to e-mail some of your assignments. Contact your teacher for the appropriate e-mail address.

Science 4

Building Devices and Vehicles That Move Assignment Booklet 2B



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Summary

	Total Possible Marks	Your Mark
Lesson 4 Assignment	11	
Lesson 5 Assignment	28	
Lesson 6 Assignment	6	
Lesson 7 Assignment	13	
Lesson 8 Assignment	4	
	62	

Teacher's Comments

Science 4
Module 2: Building Devices and Vehicles That Move
Assignment Booklet 2B
Learning Technologies Branch

The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Assignment Booklet.

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Page 10: *bird, car, cat* © 2005-2006 www.clipart.com

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Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	



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- Learning Technologies Branch, <http://www.education.gov.ab.ca/lrb>
- Learning Resources Centre, <http://www.lrc.education.gov.ab.ca>

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ASSIGNMENT BOOKLET 2B

SCIENCE 4: MODULE 2

SECTION 2 ASSIGNMENT AND SECTION 3 ASSIGNMENT

This Assignment Booklet is worth 62 marks out of the total 84 marks for the assignments in Module 2. The value of each assignment and each question is stated in the left margin.

Read all parts of your assignment carefully and record your answers in the appropriate places. If you have difficulty with an assignment, go back to your Student Module Booklet and review the appropriate lesson. Be sure to proofread your answers carefully before submitting your Assignment Booklet.

Note: If you are using electronic assignments, you will need to do the following:

- You need to print the pages that ask you to make a drawing. You will find them in your PDF file.
- You will need to mail your drawings to your teacher

39

3



Section 2 Assignment: A Designer at Work

4. a. Ask your home instructor to help you. You must design a machine that acts as a burglar alarm. It needs to be safe and practical. Use one pulley and at least one other simple machine. Choose an idea that uses materials that you can find. **Note:** Your idea must be different from the ideas shown in the Student Module Booklet. (You will build the alarm in the next lesson.)

Describe your alarm system.

Your teacher will look for

- complete sentences (1 mark)
- a clear description of your ideas (2 marks)

8

b. Make a scientific drawing of your design for the burglar alarm. Draw and label your design in the space below. Be sure to include the

- trigger (the thing that causes the alarm to go off)
- pulley system
- noise-making device that sounds the alarm

You might want to make several drawings in pencil. You can choose the best one to submit for grading. Refer to “A Closer Look” in Lesson 4 of your Student Module Booklet. It gives tips for making scientific drawings.

Your teacher will look for

- a carefully drawn diagram (4 marks)
- neatly written labels (2 marks)
- the required parts of the alarm system (2 marks)



When you are ready, turn to Lesson 5 in your Student Module Booklet.

11

5. a. Answer the following questions about the pulley part of your burglar alarm.

- What will you attach the pulley to?

- Why did you choose to attach the pulley where you did?

- Describe two ways to attach the pulley.

- Test both ways you describe in the previous question. Which was the best way to attach the pulley? Give reasons for your answer.

Your teacher will look for

- complete sentences (1 mark for each answer)
- what the pulley attaches to (1 mark)
- the reasons for your choice of what the pulley attaches to (2 marks)
- a clear description of the two ways to attach the pulley (2 marks)
- a clear explanation of why your choice was made (2 marks)

9

- b. Answer the following questions about the noise made by your burglar alarm.

- Think about ways to create noise in your alarm. Describe two different materials that you could use.

- Test both materials you described in the previous question. Which material for creating noise will you use? Give a reason for your answer.

- What is the trigger (the action that will cause the noise) in your burglar alarm?

Your teacher will look for

- complete sentences (1 mark for each answer)
- a clear description of the two noise-making methods (2 marks)
- a clear reason for your choice of method (2 marks)
- a clear description of what will trigger the noise (2 marks)

8

- c. Answer the following questions about the rest of the design of your burglar alarm.

- What other simple machine is a part of your design?

- Think about the other simple machine in your design. Describe two types of materials you could use to make it.

- Test the two materials you mentioned in the previous question. Which material will you use? Give a reason for your answer.

Your teacher will look for

- complete sentences (1 mark for each answer)
- the name of the other simple machine (1 mark)
- a clear description of the two types of material (2 marks)
- a clear explanation for your choice of material (2 marks)



Now return to your Student Module Booklet and read the Section 2 Conclusion and the Optional Follow-up Activities. Then turn to Lesson 6.

23

6

Section 3 Assignment: Building and Refining the Design

6. Test your machine and observe how it works. Judge your design and materials by answering the questions below. Put an X in either the “Yes” or “No” column.

Note: There are no “right” or “wrong” answers here. You are looking carefully at the machine you made and the materials you used. You are letting the teacher know how your choices worked.

Observations	Yes	No
Did the string break or stretch?		
Was the string attached well to the trigger and to the noise-making device?		
Did the string run well through the pulley?		
Did the pulley come loose?		
Does any part of the alarm need to be moved to a different position?		
Was the noise loud enough to hear from a distance?		

Your teacher will look for

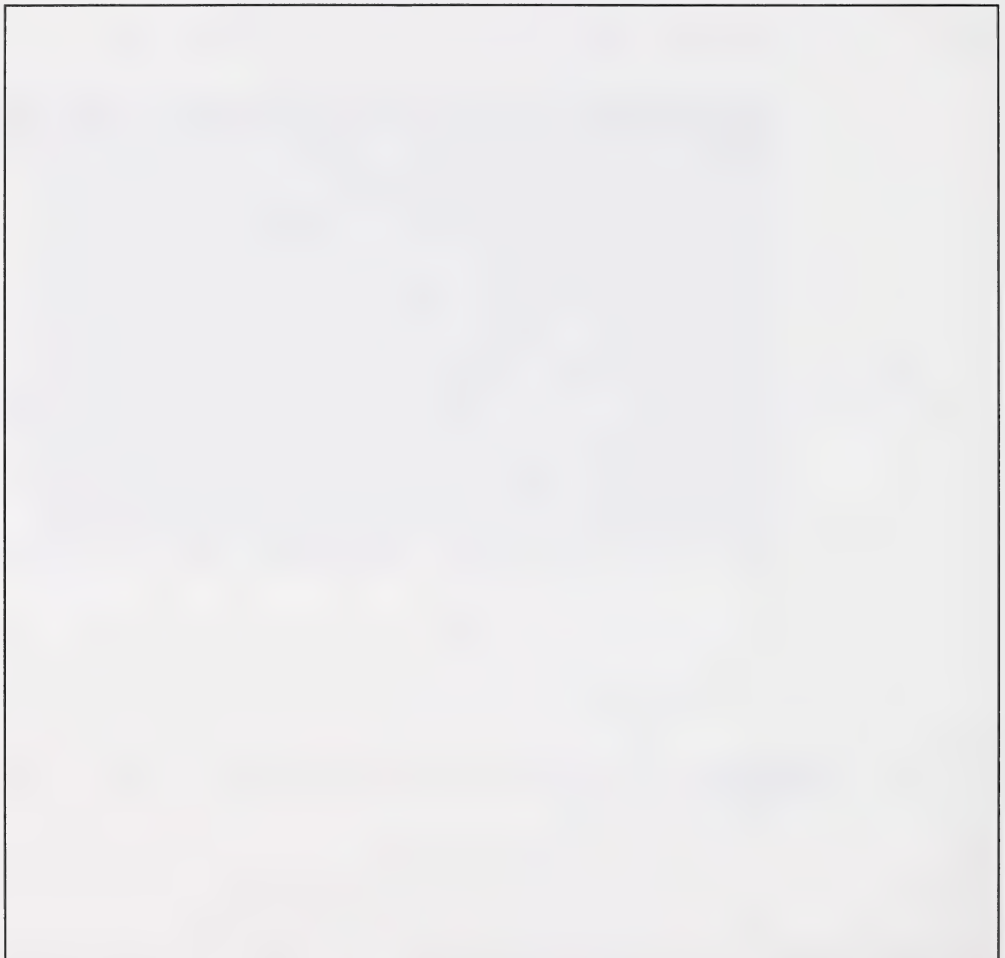
- the logical connections between your answers (6 marks)



When you are ready, turn to Lesson 7 in your Student Module Booklet.

7. You finished making your improved burglar alarm in Activity 7. Study your alarm. It has a number of simple machines in it. Then answer the following questions.

- ⑧ a. Draw a scientific drawing of the final, improved design for your burglar alarm. Be sure to label the parts and tell which materials you used in each part.



Your teacher will look for

- a carefully drawn diagram (4 marks)
- clearly written labels (2 marks)
- the required parts of the alarm system (2 marks)

5

- b. Fill in the following chart about the parts of your burglar alarm. Remember what you needed to include in your design. (Your design needed a pulley and at least one other simple machine.)

Type of Simple Machine	What It Does
pulley	

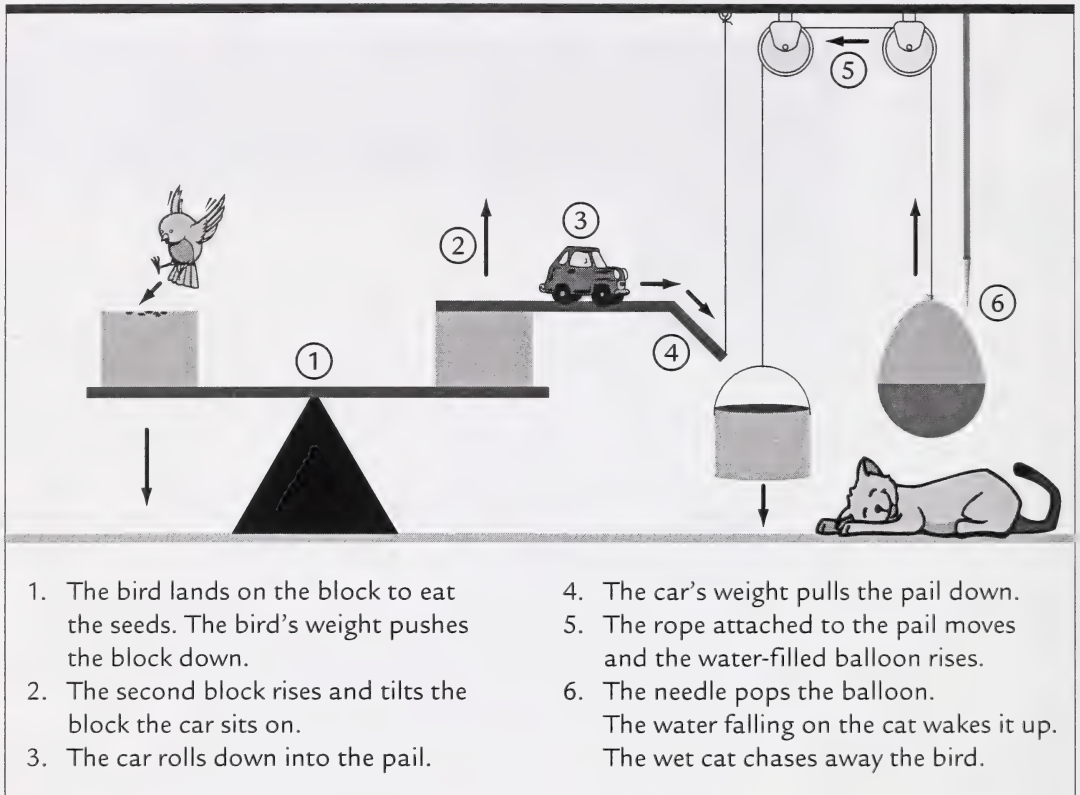
Your teacher will look for

- the name of another simple machine used in your alarm (1 mark)
- clear explanations of what each machine does in your alarm (2 marks each)



When you are ready, turn to Lesson 8 in your Student Module Booklet.

- ④ 8. Look at the imaginary machine in the cartoon. It includes many of the simple machines you have studied. Which machines can you find?



Look at the numbers beside the machines in the cartoon. Write that number beside the name of the machine. There may be more than one number for a machine.

_____ inclined plane

_____ wheel and axle

_____ pulley

_____ lever

Your teacher will look for

- correct number or numbers beside each machine type (1 mark each)



Now return to your Student Module Booklet and read the Section 3 and Module Conclusions and the Optional Follow-up Activities.

Home Instructor Feedback Form

Module 2: Section 2 and Section 3

Answer the following questions and mail them in with the completed assignment for this section.

1. Did your student design a workable plan for the burglar alarm? Why or why not?

2. How many simple machines (from Module 1) did your student incorporate into the burglar alarm?

3. Was the construction of the burglar alarm hindered because you couldn't obtain some of the materials needed? If so, which materials?

Please add any questions or comments you may have.

Student Feedback Form

Module 2: Section 2 and Section 3

Answer the following questions and mail them in with the completed assignment for this part. This is not a test and there are no marks assigned.

1. Did you have any difficulty with the brainstorming? Why or why not?

2. Would you like to be an inventor? Why or why not?

3. Did someone help you with parts of the module? Answer Yes or No.

- a. Who helped you (parent, friend, and so on)?

- b. What did they do to help?

- c. In which parts did they help you the most?

- d. How much did they help you? (Place an X at the best place on the line.)

never	very little	in about half the lessons	in most lessons	every step of the way

Checklist for Module 2: Assignment Booklet 2B

Make sure you send in all of the following items:

- ☐ Assignment Record Form
- ☐ Assignment Booklet 2B, questions 4–8
- ☐ Home Instructor Feedback Form
- ☐ Student Feedback Form
- ☐ Optional Follow-up Activity (optional)

If you are completing your Assignment Booklet electronically, advise your teacher how you are submitting the following:

Question 4.b.

Question 7.a.
